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ASEPTICALLY PACKED MILK IN ONE-WAY CONTAINERS WITH A SHELF-LIFE OF 4 WEEKS WITHOUT REFRIGERATION, A REVOLUTIONARY NEW TECHNIQUE WITH IMPACT ON MILK DISTRIBUTION : DAIRY LOCALIZATION AND MILK PRODUCTION POTENTIALS

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ASEPTICALLY PACKED MILK IN ONE-WAY CONTAINERS WITH A SHELF-LIFE OF 4 WEEKS WITHOUT REFRIGERATION - A REVOLUTIONARY NEW TECHNIQUE WITH IMPACT ON MILK DISTRIBUTION, DAIRY LOCALIZATION AND MILK PRODUCTION POTENTIALS

by
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This paper discusses some aspects of a new and entirely different approach to the problems of milk (albumin distribution, especially in warm countries, through UHT-treated milk, aseptically packed in Tetra Pak.

The two greatest problems of milk distribution in less developed areas, especially in hot climates, are time and temperature. Ordinary pasteurized milk has, for instance in India, a life-time of only a few hours. Refrigeration chains from the dairy to the housewife are in most cases impossible to build up because of the high investment costs. The logical result has been that the dairy industry has become localized within a short distance of the consumption centers. Now the consumption centers seldom lie in the areas most suitable for milk production. At the same time the production of fresh vegetables and other perishable goods around the towns competes with milk production.

For many years it has been possible to sterilize milk in glass bottles. This milk has never become extensively used, partly

because of the inferior quality of the milk after the in-bottle sterilization process, partly

because of the inherent, possibly unsolvable hygienic difficulties connected with the use of reusable containers for sterile products in hot climates and lastly,

because the glass bottles as such can only be used for short-distance, local transportations and consequently the sterilized bottle cannot solve the problem how to increase the supply of nationally produced milk to the low income consumers in the less developed areas.

For many years it has been obvious that the only logical solution of this problem would be a nonreturnable milk container with a shelf-life - under unrefrigerated conditions - of at least a few weeks. It has also been clear that no large volume operation could be built up unless the milk was put on the market at a cost which would be reasonable also for the ordinary workman. Milk should not be a luxury product. This consideration has until now ruled out all possible packages, since until now no package has existed which

1. gave the milk a shelf-life of 4 weeks without refrigeration,
2. was nonreturnable,
3. could be produced in any size from less than one oz. up to 1 quart,
4. was sufficiently economical also in small sizes so that the average workman can find a size the price of which lies within his means,
5. made possible sterilizing methods which give a good quality milk,
6. avoided the destruction of up to 30 % of the milk's albumins through the in-the-bottle sterilization.

The chemical changes through in-bottle sterilization have the

effect that up to 30 % of the milk albumins cannot be digested or used by the human body. This hidden and relatively unknown fact means for glass bottles a hidden cost increase, since the destroyed milk is wasted and useless, even if it is consumed.

This destruction of the milk can be avoided by cutting down the time the milk is exposed to heat from 15 - 20 minutes to a few seconds.

For many years it has been possible to make milk entirely free from bacteria through a shock treatment with heat. The milk is heated for a period of 2 - 5 seconds with temperatures ranging up to 145°C in special machines. These machines have been used in practice only to a small extent, since the high quality milk they give - a quality comparable with ordinary pasteurized milk with regard to taste, nourishment etc. - has not been possible to distribute. In the packaging process the milk has been reinfected and consequently the machines have offered no advantage over ordinary pasteurizing machines.

All this is changed by Tetra Pak Aseptic. Tetra Pak Aseptic is a modified version of the well-known Tetra Pak machines. All Tetra Pak machines form the packages from a roll of paper which is formed continuously into a tube and then in one operation filled and heatsealed into tetrahedrons.

(Picture)

The Tetra Pak Aseptic machines let the paper go through a peroxide bath so that the inside of the paper tube is moist. In the tube about 4 feet above the milk level an electrical element is placed which causes the peroxide on the paper surface to boil. This boiling peroxide gives full sterility. At the same time the heat

splits the peroxide into oxygen and water which is reduced to vapour. The lowest part of the heating element creates a "dry zone" which gives the dairy a safety margin and an absolute guarantee that no peroxide can ever come in contact with the milk.

The aseptic "chamber" consequently consists of the lower part of the paper tube itself. There are no moving parts on the inside of the tube. Since the heatsealing jaw and all other machine parts work only against the outside of the tube it is not necessary to sterilize them.

It is consequently possible to fill the ultra-high-temperature-heated milk - with its excellent quality - into Tetra Pak containers under aseptic or sterile conditions. The milk will keep for one month without refrigeration.

This extremely simple method of packing milk aseptically, which was technically possible only because of the continuous Tetra Pak system, has now been thoroughly tested in commercial operation.

In the highly industrialized countries with their quickly increasing wage costs and ever more difficult transportation (distribution) problems (traffic snarls, parking problems etc.) the savings in the distribution costs may be decisive. Aseptically packed milk can also be bought and stored by the housewife in the same way as other products so that she always can have a supply of milk at home and does not have to shop every day.

In countries with a low standard of living the costs of operating glass bottle plants are often quite high and the hygienical problems connected with returnable containers in a hot climate may be difficult

to solve. This is one of the reasons why for ordinary pasteurized milk the use of nonreturnable (Tetra Pak) containers is spreading rapidly also in these countries.

Aseptic filling makes possible an entirely new approach to the problem of milk distribution in the hot countries. The investment costs are far lower than those of any other method, since no refrigeration of the milk is necessary either in the dairy after filling or in the distribution system. Milk aseptically packed in Tetra can be stored for as much as a month. It is therefore possible to situate dairies where milk is available, not necessarily where the consumers live. In many areas the potential milk supply cannot be utilized in its fluid form in a rational way for lack of markets. The milk is in one district, and the customers for fluid milk may live hundreds of miles away.

Sometimes, for lack of markets, the milk is not produced at all or on a far lower scale than the potential one.

With Tetra Pak Aseptic the national production of milk can be increased in a faster and more rational way.

An additional advantage is that, generally speaking, areas situated near consumption centers and now used for the production of milk should be made available for production of fresh vegetables etc.

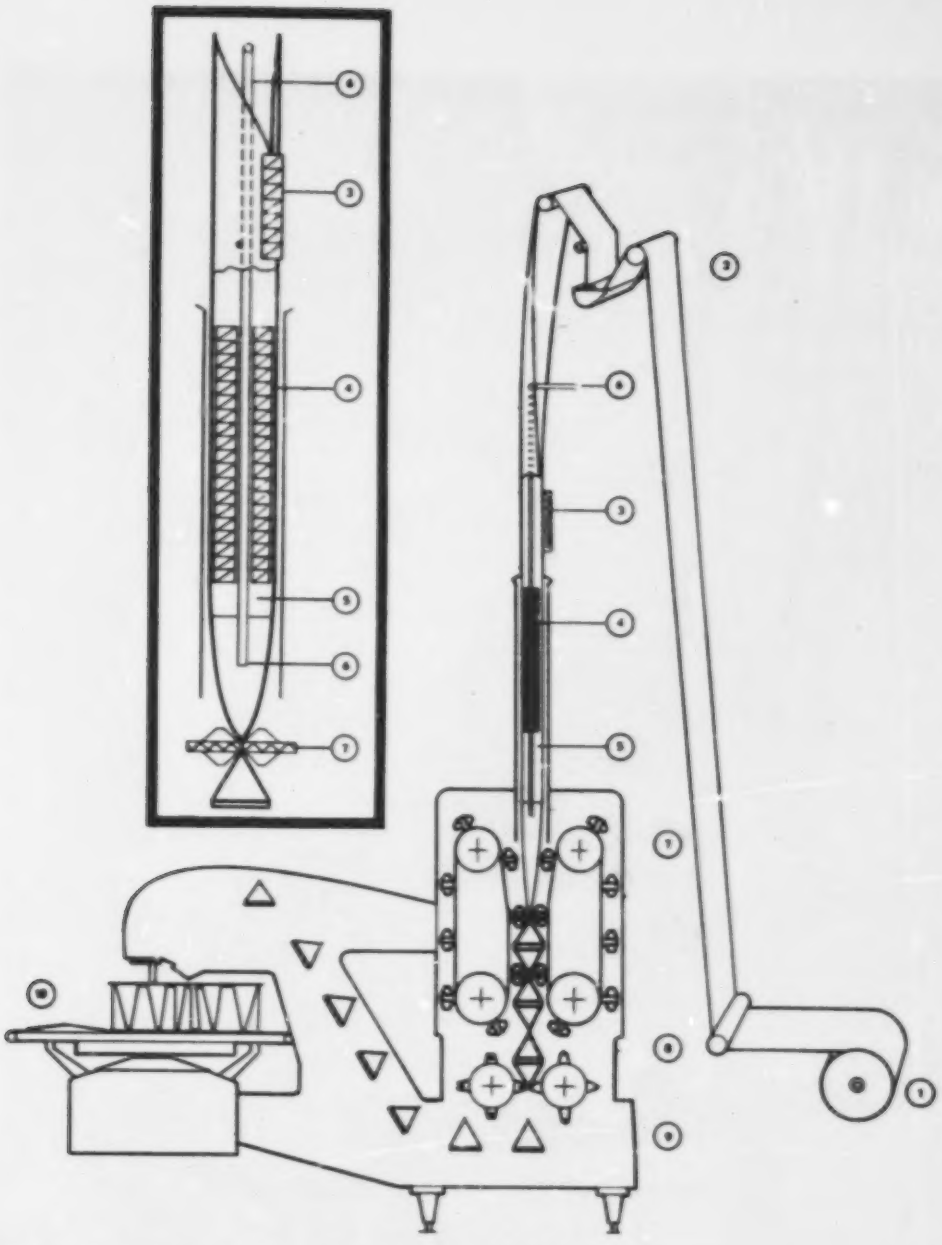
It is difficult to estimate the costs of the Tetra Pak Aseptic system. In many cases the total cost for aseptic Tetra Pak milk (counting also supply and distribution costs) will be lower than for instance the costs of pasteurized milk. More important is perhaps that Tetra Pak Aseptic often may be the only economically possible way to arrange for a supply of milk to a certain area or to provide outlets for the milk from an isolated production district. In each country a calculation must be made taking in

regard the local conditions (transport distances, type of distribution system, supply sources of raw milk etc.).

It is a well-known fact that the costs of packing a given quantity of milk in Tetra packages are about half of the corresponding costs for other one-way cartons. It is of great importance that costs within the dairy of the Tetra Pak aseptic method - while higher than the cost for ordinary Tetra packages - are still lower than the corresponding costs of any other milk carton - and you get the one month shelf-life into the bargain.

In other words, Tetra Pak Aseptic gives you a lower cost than other cartons for pasteurized milk and in addition the tremendous advantage of having a milk which keeps without refrigerating for one month, which can be transported for thousands of miles and which can be sold through the same type of retail outlets as ordinary consumption goods.

A final aspect of the Tetra Pak method is that the relative economy in relation to all other methods, cartons or bottles, is improved as the size of the package gets smaller. This has very practical significance in countries with a low standard of living where it is important to supply relatively small quantities of milk so as to enable also the poor man to buy at least a minimum of this vital food.



The Tetra Pak machine incorporated in the plant is a standard model modified as shown in the diagram above.

1. Roll of paper.
2. Chemical bath
3. Longitudinal heat sealer
4. Element for heating the tube
5. Bacteria free region
6. Milk input pipe
7. Heat sealing jaws for the transverse seam
8. Cutter
9. Conveyor belt
10. Automatic crater

Fig. 1 - The principle of Tetra Pak Aseptic.

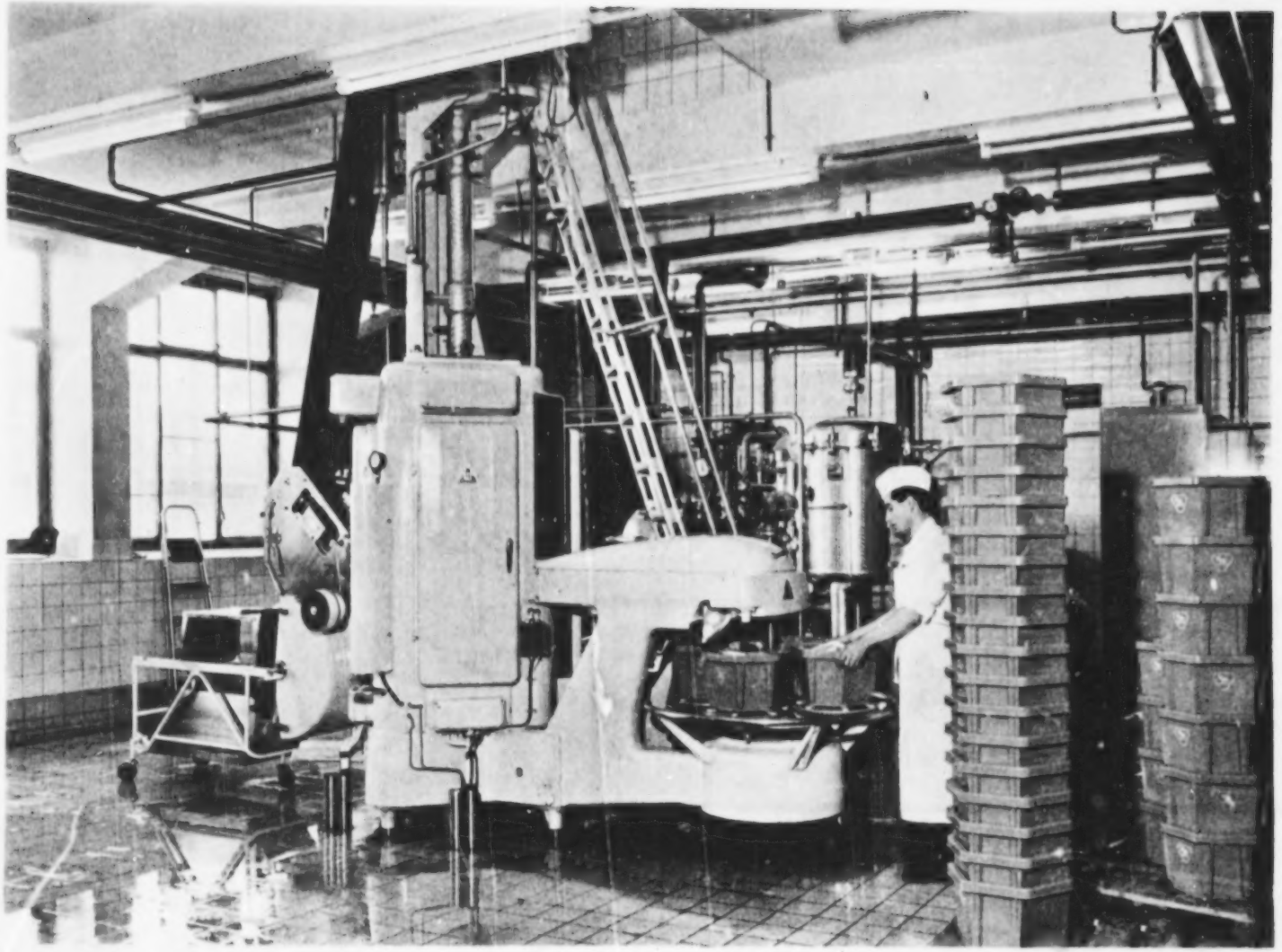


Fig. 2 - The first Tetra Pak Machine for aseptic filling - in series production - at work at Verbandsmolkerei Bern. Eighteen months of continuous marketing research with an experimental machine preceded the introduction of this machine on a commercial basis. Throughout this period, milk treated by steam injection and packed aseptically in Tetra Pak at the Bern dairy was distributed without the consumers noticing any difference between this milk and the usual pasteurized product.

Fig. 3 - Milk with a shelf-life of one month means that milk can be sold over the counter just like any other product - without refrigeration and without special storage facilities. Sales methods, and the supply on which these methods are based can be put on a completely new footing, and milk can be made available to the consumer in quite a different way from previously.

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